

## **Integrating Distributional, Spatial Prioritization, and Individual-Based Models to Evaluate Potential Critical Habitat Networks: A Case Study Using the Northern Spotted Owl**

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As part of the northern spotted owl recovery planning effort, we evaluated a series of alternative critical habitat scenarios using a species-distribution model (MaxEnt), a conservation-planning model (Zonation), and an individual-based population model (HexSim). With this suite of modeling tools, we were able to quantify simulated spotted owl population responses to multiple realistic (but hypothetical) conservation scenarios. Each scenario represented a different set of assumptions regarding critical habitat size/spatial arrangement, trends in relative habitat suitability, and the severity of barred owl impacts. A total of 98 such hypothetical conservation scenarios were evaluated using HexSim, and the results were used to inform the US Fish and Wildlife Service's critical habitat designation process. Simulated spotted owl population size, spatial distribution, and extinction risk were the parameters used to rank the alternative scenarios.

We were able to identify specific conservation scenarios that, assuming a reduction in barred owl impacts, would stabilize future spotted owl population numbers while preserving their distribution throughout the majority of their current range. The modeling framework we developed, in particular our methods for the application of HexSim, should be readily transferrable to other reserve planning studies. Finally, our study illustrates how to quantify the relative risk of conservation scenario design decisions while there is still flexibility in the planning process.